

## An Overview of Zinc and its Intralesional Role in Treatment of Multiple Recalcitrant Warts: Review Article

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### ABSTRACT

**Background:** Human papilloma virus (HPV) causes viral warts, which affect around 10% of the population. HPV types 1, 2, and 57 are frequently implicated as etiological factors in the majority of cases. It's more difficult to diagnose and cure HPV 4 and 7 because of their rarity. It is possible to combine several treatments for viral warts because treatment might be time-consuming in some circumstances, even when various options are accessible. In spite of reports of successful systemic acitretin therapy for viral warts resistant to previous treatments, oral acitretin therapy has only been used in a limited number of cases.

**Objective:** Assessment of role of intralesional zinc sulphate 2% in the treatment of multiple recalcitrant warts.

**Methods:** Warts, Zinc sulphate, Recalcitrant warts, and the Human Papillomavirus were all looked for in PubMed, Google scholar, and Science direct. References from relevant literature were also evaluated by the authors, but only the most recent or complete study from January 2000 to January 2022 was included. Due to the lack of sources for translation, documents in languages other than English have been ruled out. Papers that did not fall under the purview of major scientific investigations, such as unpublished manuscripts, oral presentations, conference abstracts, and dissertations, were omitted.

**Conclusion:** Warts can also be cleared with intralesional 2 percent zinc sulphate. Children may benefit from using topical or oral zinc as an alternative to harsh manual treatments for warts.

**Keywords:** Human Papillomavirus, Recalcitrant warts, Warts, Zinc sulphate.

### INTRODUCTION

Warts can develop as a result of a genital HPV infection. Genital warts will not develop in 90% of HPV-infected people. People who contract the virus will only transfer it to roughly 10% of those who are infected. Human papillomavirus types 6 and 11 are to blame for genital warts. There are more than 100 distinct HPV strains. HPV is transmitted through direct skin-to-skin contact with an infected person, most commonly during intercourse. The HPV strains that cause genital warts are different from those that cause cervical and anal cancer. It is possible for a person to have many strains of HPV <sup>(1)</sup>.

The prevalence of genital HPV infections ranges from 10% to 20%, with clinical symptoms occurring in 1% of those infected. HPV infections have been on the rise. At its height, the infection rate is among people aged 20 to 24, with 80 percent of those affected being between 17 and 33. Genital HPV DNA is expected to be present in 2.9% of the general population. <sup>(2)</sup>

There is no HPV cure. Removal of visible warts does not necessarily reduce transmission of the HPV virus underlying the wart. It depends on how many, how big, and where the warts are. There is a risk of lasting scarring, irritation, and irreversible depigmentation as a result of treatment <sup>(3)</sup>.

Patients can have their tumours removed surgically or with topical medicines that are either ablative (vaporisation, resection, coagulation, or excision). Warts can be removed more effectively with physically ablative therapies, but patients often choose topical medicines as an initial treatment, especially for minor lesions <sup>(4)</sup>.

### Zinc:

Zn (which is considered the 2<sup>nd</sup> most abundant transition metal after Fe) is believed to make up roughly 2–3 grammes of Zn in the human body, making it the second most abundant divalent cation after calcium. Trace elements like Zn are essential for the survival of all organisms. When unstable atoms with at least one unpaired electron cause cell damage, an antioxidant mineral like manganese can help prevent their formation and reactive response <sup>(5)</sup>. Growth, transport, endocrine and immune systems, and cell differentiation Only a few of Zn's various roles in cellular activity are RNA and DNA synthesis and DNA replication <sup>(6)</sup>.

The majority of it is located in the testicles, muscle, liver, bones, and the brain <sup>(7)</sup>. It is a key component of learning and memory and it is found in abundance in the synaptic vesicles <sup>(8)</sup>.

Besides iron, zinc is the body's second most essential trace element <sup>(9)</sup>. As a structural, catalytic, and regulatory component, Zn participates in numerous metabolic processes <sup>(10)</sup>. It is a cofactor for more than 300 enzymes and is found in the structures of over 2,000 transcription factors <sup>(11)</sup>. A variety of enzymes, such as hydrolytic enzymes, oxyreductase, ligases, isomerases, and lyases, are also included <sup>(12)</sup>.

The immune system and the regulation of gene expression are two more areas in which zinc plays an important role. <sup>(11)</sup>

Zinc's use in dermatology has increased dramatically in the last ten years. A variety of skin conditions, such as cutaneous leishmaniasis, melanomas, acne vulgaris, and even skin cancers like basal cell carcinoma, have been effectively treated with this medication <sup>(13)</sup>.

### **Concentration:**

The average adult's amount of Zn in the body is between 1.4 and 2.3 grammes, and it may be found in high amounts in nearly all of the body's tissues and secretions<sup>(8)</sup>. Skeletal muscle and bone are the primary reservoirs of Zn<sup>2+</sup>, with only a modest quantity of Zn<sup>2+</sup> circulating in the blood<sup>(14)</sup>.

### **Sources:**

Zinc and other trace minerals are necessary for human health. In mammals, birds, fish, and other animals, zinc can be found in the organs and flesh. There is a low zinc level in plant-based foods such as fruits, vegetables, starchy roots, and tubers. Cereals, nuts and legumes have a zinc concentration that is lower than that found in animal-source diets, but it is more easily absorbed than zinc found in animal products<sup>(15)</sup>.

### **Daily Dose:**

An adult male should take 11 milligrammes (mg) of zinc daily, while a female should take 8 milligrammes (mg). In adults, the highest limit of daily consumption is 40 mg<sup>(16)</sup>.

### **Absorption and excretion:**

Zinc absorption occurs mostly in the jejunum through enterocytes, which are cells that line the intestines<sup>(9)</sup>. Soy protein, glucose, and lactose improve absorption, while iron, copper, phytates, and excessive levels of calcium or too much fibre impede absorption of this mineral<sup>(17)</sup>.

Zn is primarily excreted in the feces. The amount of Zn expelled in the urine ranges from 400 to 600 micrograms each day, and under normal conditions, up to 95 percent of the filtered Zn is reabsorbed in the distal tubules. This amount coincides closely with the rate of urine production and the excretion of creatinine<sup>(18)</sup>; about a milligramme per day. Desquamation of the epidermis, hair growth, and sweat all contribute to the loss of Zn<sup>(19)</sup>.

### **Zinc and immune system:**

Due to Zn's role in cellular and humoral immunity, the immune system is greatly influenced by Zn. Macrophages, neutrophils, and natural killer (NK) cells, as well as the generation of cytokines and the action of complement, can all be affected by zinc deficiency. Zn deficiency also affects phagocytosis and intracellular killing. Zn deficiency has a negative impact on the development and function of T and B cells<sup>(20)</sup>. T cell numbers were reduced in the peripheral and thymic regions, as well as in the cytotoxic and T helper T cell functions, when zinc shortage was present<sup>(21)</sup>. Zinc deficiency causes the Th1 immune response, which defends against infection, to be suppressed, while the Th2 immunological response is boosted. Due to their weaker immune systems, patients may be more susceptible to infection<sup>(20)</sup>.

### **Zinc and skin disorders:**

Numerous skin conditions have been linked to zinc deficiency. There must be a constant supply of nutrients in order for cells to function effectively, zinc (Zn) is a necessary cofactor for numerous metalloenzymes. A

shortage in zinc can lead to skin lesions, retarded growth, weakened immune function, and slowed wound healing. Zn's role in wound healing regulates coagulation, inflammation and immunological defense, angiogenesis, and scar formation<sup>(22)</sup>.

### **Zinc and HPVs:**

Many viral proteins require zinc as a cofactor, and this has been known for a long time. Zn plays a critical role in virus invasion of the cell. A lot remains to be learned about how viruses and cells Zn interact molecularly. By default, there are at least two non-exclusive mechanisms accessible. In addition to being a structural cofactor of viral proteins, zinc has been shown to change the activity of numerous transcription factors and thus the expression patterns of cellular and viral genes<sup>(23)</sup>.

### **Zinc in the treatment of warts:**

However, zinc sulphate has been used successfully to treat viral warts, the mechanism of action of which is yet unknown. Topical zinc application has been shown to cause local irritation, which may in turn trigger an immunological response. However, it's possible that this is due to zinc shortage being replaced or to the immunomodulatory effects of zinc itself<sup>(24)</sup>. Common warts can be treated with zinc, which has been shown to be effective in both oral and topical applications without causing severe side effects. Zinc sulphate was studied for its efficacy in the treatment of viral warts and found to be effective. Zinc sulphate solution was applied three times daily for four weeks to 10 patients with aircraft warts in a pilot clinical trial. There was complete recovery for 80% of the patients. It was also provided as part of this study that 50 patients with common or planar warts and 40 patients with plane warts, both of whom were treated with zinc sulphate solutions applied three times a day for four weeks, were studied<sup>(25)</sup>.

Using 10% and 5% zinc sulphate solutions, 85.7 and 42.8 percent of plane warts were completely eliminated, but only 11 and 5 percent of common warts were completely eliminated, which was statistically insignificant. In **Khattar and colleagues**<sup>(26)</sup> study, a 44-patient randomized double-blind controlled study, zinc oxide was found to be more efficient than salicylic acid and lactic acid ointment in curing warts. A zinc oxide treatment helped 50% of patients with common warts fully recover after three months, but only 42% of patients in the control group healed entirely. In a randomised, placebo-controlled study<sup>(27)</sup>. A two-month course of oral zinc sulphate (10 mg/kg/day) was found to be completely effective in treating common warts in 61% of patients after one month and 87% after two months. This is significantly higher than the 50% clearance rate found after two months in an open-label clinical trial conducted by **Mun and colleagues**<sup>(28)</sup>.

Warts can also be treated with intralesional zinc sulphate at a concentration of 2 percent. The use of zinc as a treatment for warts, especially in youngsters where

less intrusive, less unpleasant ways of treatment are available, can be successful<sup>(29, 30)</sup>.

## CONCLUSION

Warts can be cleared by intralesional application of zinc sulphate with a 2% concentration. Using zinc topically or orally can be an effective treatment for warts, especially in children, for whom less invasive, less unpleasant methods of treatment are available.

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